

**Description of
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The invention relates to a rotor blade heater and a lightning derivative mechanism.

Known ones are heating foils to the heating of the rotor blades in freezing up-endangered fields. Further lightning current derivation mechanisms become incorporated in rotor blades, which either when embedded metal fabric or in the sheet-inner as inserted conductor realized are.

Conventional heating foils are not lightning current load-carrying, since they are also equipped to small effective cross sections and also their structure is not suitable for lightning current derivative. With use of heating foils as well as lightning current derivation mechanisms in a rotor blade next to each other is not other ensured that the lightning current takes the path over the arrester and not over the heaters and the heating foils so perhaps nevertheless destroyed become.

Object of the invention is it to realize a simple rotor blade heater beside a lightning current derivation.

This by the features of the principal claim dissolved becomes according to invention. The Unteransprüche show favourable embodiments of the invention.

In particular it is favourable that by the combination of both systems ensured becomes that the heating system does not become destroyed by thunderbolt.

By the arrangement of two or a several adjacent conductor, which run along the leaf within the mast range of the profile, and within the hub range to the low-voltage coil of a transformer connected are, become the lightning current arrester in dual function by the warm one resulting as dissipated heat at their ohmic drag as heating element, as work also as arresters.

In the blade tip a conductor bereichsweise the bottom cap can be shifted, in order to also heat

also these. The conductors can become more other by carbon fiber belts on upper and underside replaced, which direct as conductors used to become to be able, if the leaf with a supporting structure from carbon fiber belts is constructed.

With choice of separate conductors these preferably flat and crossed formed can become, in order in such a way to avoid by a symmetrical division of the lightning current river undesired current portions by the low-voltage coil of the Trafos if possible.

Case isolated metal cables in sheet-inner use find, can these in or multiple by the core inserted become, in order to form thereby the low-voltage coil.

On the high voltage side can if the lightning current unsymmetrical on the conductor flows, a considerable voltage induced to become, which however by a surge arrester of the Trafos limited to become to be able.

In addition will proposed to ground the low-voltage coil in the center since then two parts of the Niederpannungswicklung of continuous lightning current portions waive themselves in each case moving in opposite directions in the Trafo in the effect on the high voltage side.

More other a lighter Trafo, than ring or bowl core formed, fed with higher frequency, can find use instead of a Trafos operated with frequency.

Other advantages and features of the invention result from subsequent description of a preferred embodiment on the basis the accompanying drawing. Shows:

Fig. 1 the structure in principle, is fabricated with which an electric connection between the lightning conductor and the hub,

Fig. 2 the same structure, whereby an electric connection between conductors with the lightning current mechanism over sharpening contacts or spark gaps realized, keeping away from the metallic parts hub and shaft, is,

Fig. 3 the same structure, whereby an electric connection between conductors with the lightning current mechanism over sharpening contacts or spark gaps realized, keeping away from the metallic parts hub and shaft, is.

Fig. 4a the section by a rotor blade and the ply of the strengthening carbon fiber belts,

Fig. 4b a top view on a section of the rotor blade with that the additional contact of the carbon fiber belts illustrated is,

Fig. 5 the schematic course of crossed conductor starting from (metallic) the blade tip cap,

and

Fig. 6 the same structure schematic as schematic diagram.

Into the Fig. 1-3 represented Trafo becomes with frequency and a conventional voltage of approx. four to seven hundred volts supplied it becomes already essentially disposed in the region of the sheet flange from the rotor hub disengaged in the leaf.

The conductors 10 become on the low-voltage side favourable-prove with a voltage of five to twenty volts supplied, so that a current flows from approximate fifty to one hundred amperes.

With numerals 14 and 16 is an other electrical contact distance between the conductors 10 on the low-voltage side of the Trafos 12 indicated, which manufactures the electrical contact between the leaf and the hub. The lightning current will become therefore over the hub and the shaft in the tower derived here.

In the Fig. 2 past is in an alternative representation a current removal at hub and shaft over a spark gap or a sliding contact connection provided. The lightning current can become then outer at the tower derived.

In order to prevent that the lightning current flows partially by the low-voltage coil of the Trafos and thus in the high-voltage wrapping overvoltages induced become, the conductors each other crossing disposed. Proposed (Fig becomes more other. 3), a lightning current grounding to the center of the low-voltage transformation 20, which by the conductors 10 formed will to put on.

The Trafo should exhibit other in isolated cables a higher tension strain, as the voltage drops at the lightning current derivative mechanisms the low-voltage side of the Trafos central at the winding favourable-proves 14, 16 or 18 to ground.

It may not be forgotten however that even if besides once the heater becomes destroyed with a thunderbolt, is this still as successful lightning derivative to rate, since the lightning-deriving part and besides the leaf and the residual wind-powered device undestroyed remain.

The conductors can run with their sheathing without separation of the blade tip around the Trafokern wrapped to the blade tip, or formed conductors connected can become laminar by fittings in the leaf (Fig. 4a and 4b). The transformer will be able to become other on the high voltage side still by surge arresters against voltage differences protected, like this in Fig. 6 as schematic diagram indicated is.

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1. Rotor blade heater and lightning derivative mechanism with at least two conductors (10) in the rotor blade, characterized through
 1. over a transformer (12) the heating wire with heating energy supplying power supply, connected on the low-voltage side, and
 2. before this Trafo disposed lightning current derivation (14, 16, 18), which with at least one the conductor (10) stands in electrical contact, whereby the conductors (10) with a drag of approx. a tenth ohm for a filament current of approx. one hundred amperes with a voltage of approx. ten volts formed are.
2. Rotorblatt-Heizung und Blitzableitungseinrichtung nach Anspruch 1, gekennzeichnet dadurch, dass im Blatt vorhandene Kohlefasergurte als Leiter (10) Verwendung finden.
3. Rotor blade heater and lightning derivative mechanism, after one of the preceding claims, characterised in that the conductors (10) over the length of the leaf cross.
4. Rotor blade heater and lightning derivative mechanism after one of the claims 1 or 3, characterized by isolated, metallic conductor (10) in the leaf, which forms the winding without separation on the low-voltage coil of a Trafos.
5. Rotor blade heater and lightning derivative mechanism after one of the preceding claims, characterized by a lightning current ground (18) the conductor on the low-voltage coil (20), which is connected to the center of the low-voltage coil (20).